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ABSTRACT

Seeking to understand where students are at in reference to their preconceived attitudes and knowledge concerning environmental issues was the purpose for undertaking this research study. An analysis of environmental information sources, both the schools and the media, appeared necessary. Only in this manner can environmental education programs be designed or relevant curriculums planned which can help students understand the information about, and comprehend the range and complexity of, the environment. The project developed an instrument to determine: high school students concepts and definitions of physical, biological, cultural, social, and technological environment; environmental parameters and priorities; environmental value judgments; and personal actions to initiate change. Instrument questions covered wide areas of environmental information and were approached from three directions--cognitive, affective, and connotative. Analysis clearly indicated areas of strength, weakness, and misconceptions in the information high school students gain from their school and the media. There also appears to be a relation between the information a student has and his willingness to express an opinion. It is believed future research needs to consider not only the source and intensity of environmental information, but the processing ability of students as well. The questionnaire is appended. (BL)

HIGH SCHOOL STUDENTS AND THEIR CONCEPTS OF THE ENVIRONMENT: TWO MUTUALLY EXCLUSIVE SETS *

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Environment has become a household word. TV, books, magazines and school curriculum reflect the tremendous interest and concern of the American people and, indeed, the world. The elementary and secondary schools, recognizing their responsibilities to interest and inform the students, are including material on the various aspects of the environment. However, the media has provided a counter-information source and students frequently are more informed in some areas than their grade level would suggest and misinformed or even ignorant of the existence of other aspects.

In order to plan a relevant curriculum for students, it is necessary to understand their attitudes and information. There is often a tendency to assume that we already know the attitudes of the students, but such an assumption is extremely naive. The naivety is due to a myriad of factors including: relativity of perception; increased amount of exposure of younger students to the media; changing norms and changing attitudes concerning the relation of the individual in society. As a result of these and other consideration, it seems important to first understand "where the students are at" in reference to their preconceived attitudes and knowledge concerning environmental issues.

This project developed an instrument to determine high school students concepts and definitions of: physical, biological, cultural, social and technological environment; environmental parameters and priorities; environmental value judgements; personal actions to initiate change. To obtain responses in these areas the instrument used content questions covering wide areas of environmental studies, an opinion section

built on the work of Barnhart and Steiner (1971), and a section which determines attitudinal direction from the cognitive domain.

The basis of the instrument for our exploratory research is the multiple working hypothesis, (Chamberlain, 1890). No one area of environment is considered as The problem. An attempt is made to include components from many areas of environmental concern. In this manner the following areas were included in the instrument: air, soil, water, thermal, and noise pollution; personal role and responsibility toward environment; chemicals and pesticides; legal, socio-political and economic considerations; technocracy and population; industry and recycling. The information included in these areas was approached from three directions: cognitive or what students know; affective, or what students believe; connotative or what students think should be done. This design is used to gain insight into the operating level of environmental awareness of high school students. Its results are general. They define future areas of research, and raise disturbing questions about high school programs.

The questionnaire used is reproduced in the Appendix. The students' responses to each question are listed in the Appendix for the total population (454 students), the top fifth (84 students), and the bottom quarter (116 students). These top and bottom subgroups were obtained by their respective scores on a 17 item environmental content subtest. This subtest included the following test items: 1, 3, 4, 5, 11, 12, 14, 16, 17, 20, 22, 23, 27, 29, 31, 32, 35. The Kuder Richardson reliability for this 17 item subtest was 0.42. The standard error of measurement was

1.95. With these statistics it is clear that the top group, whose scores was 9 and above, and the low group, whose score was 4 and below, represent two mutually exclusive subgroups. For the remainder of this paper those students with scores 9 and above will be considered the High Environmental Content group (High EC). Those scoring 4 and below will be considered the Low Environmental Content group (Low EC).

Figures 1, 2, and 3 show the composition of the two groups by sex, age, and school location. Figure 4 shows the frequency distribution for the total population on the 17 item content subtest.

There are many combinations of questions and interesting areas and relationships which can be gained from the data in the Appendix. For the purpose of this paper only a few areas are considered.

The media obviously has potential to effect the high school student. In question 2 the students ignored NTA and chose detergents as the primary cause for the rise in phosphate pollution in our nation's streams. Question 6 deals with the same concept of phosphate pollution. This time the student ignored soap flakes in favor of non-sudsing detergents as the cleanser which produces the least amount of pollution. The students chose detergents as a major cause of pollution but chose non-sudsing detergents over the soap flakes. This type of inconsistency occurs frequently and will be discussed later.

	High EC	Low EC	Total
Male	50	47	97
Female	34	69	103

Chi square test $\geqslant$ 0.01

Figure 1. Numbers of males and females in High Environmental Content (High EC) and Low Environmental Content (Low EC) groups.

Age	High EC	Low EC
14	0	3
15	7	26
16	31	31
17	32	30
18	14	19
19	0	4
20	0	1
No Record	0	2

Figure 2. Numbers of students, by age, in High Environmental Content (High EC) and Low Environmental Content (Low EC) group.

School Location	Total Students	High EC	Low EC
1. Small town	64	9	15
2. Small town	45	21	3
3. Rural	37	8	8
4. Suburban	49	15	9
5. Urban	92	19	24
6. Urban	89	7	30
7. Urban	78	5	27
Total	454	84	116

Figure 3. Population and composition of High Environmental Content (High EC) and Low Environmental Content (Low EC) by location of school.

SCORE	FREQUENCY	CUMULATIVE FREQUENCY
14	1	454
13	1	453
12	10	452
11	20	442
10	20	422
9	32	402
8	54	370
7	61	316
6	60	255
5	79	195
4	48	116
3	42	68
2	18	26
1	8	8

Mean = 6.24 Standard Deviation = 2.56
Kuder Richardson Reliability = 0.42
Standard Error of Measurements = 1.95

Figure 4. Frequency Distribution for total population 17 item content subtest.

Question 27 is almost exactly the same as Question 6, with biodegradable replacing soap flakes as a response. Nineteen percent of the High EC group selected soap flakes in Question 6 but sixty-eight percent selected biodegradable in Question 27. The Low EC group kept their original responses. It appears that there is no concept of soap, but for some students terminology may be the key to correct responses.

Another example of media related information is Question 33 which finds the student not at all convinced that offshore drilling is safe or that new oil tankers are as foolproof as the oil industry says they are. The response of the students to Question 17, makes one think of the efforts of paper, can and glass companies to encourage recycling. Can their campaign for recycling be successful?

The mixed effectiveness of the media on the environmental concepts of high school students makes us wonder about or original premise that the media has influence. The work of Etzioni (1972) would support our tentative results. He finds advertising programs can make people change brands but not start or stop smoking. We see the need for research to investigate the effect of media on students concepts of environment.

In addition to media, it is "intuitively obvious" that schools are the other major source of environmental information. Question 3, the food chain concept, should be recognized by high school students. 74% of the High EC group selected it, but only 27% of the Low EC group were aware of the concept. Questions 12 and 31 approach the same concept and the two groups remain split on their responses. The

High EC group is aware of the concept and the Low EC group is not. For Question 11, the cause of red sunsets, the High EC group again shows their ability to be effected by school learning and their understanding of refraction while the Low EC group is uneffected by school.

Question 23 deals with the "green house" effect caused by increased concentration of carbon dioxide in the atmosphere. The High EC group and the Low EC group failed to recognize this. A 45% response rate by the High EC group in favor of particulate matter as the cause of atmospheric heating is consistent with their answer to number 11. It is surprising however, that their acceptance of similar words leads to an incorrect response.

The key question at this point, a question about which there are many ideas, would ask why the High EC group does well on some questions but falls apart on others.

Question 21 and 32 deal with meterology and climatology, the concepts of thermal inversions and dispersion. The responses indicate a lack of information by both the High EC and Low EC group. The poor responses to question 15 and 30 add another over-looked area of environmental study, dams and water management. While the High EC group appears to do well on some school learned information, the preceeding four questions discussed indicate a large gap in the environmental education of high school students.

The similarity of item response by the High EC group on the multiple response question is expected by definition. The Low EC group

was not expected to select similar response to any question. The fact that the Low EC group selected similar responses (40% or above selected the same choice) in their answers to questions 4, 8, 14, 15, 20, 25, 27, and 32 is evidenced that their choices are not random. They did read the questions. This information is also useful for evaluating misconceptions and for possibly explaining the schemata of the Low EC group.

An example of the above is evident in Question 14. The High EC group selected automobiles as the biggest contributor to air pollution. 53% of the Lower group chose manufacturing industry. This is similar to the Low EC responses to questions 8 and 20, when for each question over 40% blame industry for pollution.

The difference between the High EC and the Low EC groups on the multiple choice section of the questionnaire might be expected. It is interesting that these differences are also clearly evident in the continuum response section. The High EC group selected an action, "agree or disagree" or "strongly agree or strongly disagree" more often than the Low EC group. The Low EC group chose the response "no concern," more often, (figure 5).

	High EC	Low EC
30% or more selected agree or disagree, or strongly agree or strongly disagree	28	14
30% or more selected strongly agree or strongly disagree	11	3
30% or more selected no concern	3	11

Figure 5. Number of questions for which at least 30% of the High EC group or Low EC group selected the same response.

The similarity and strength of feeling for the High EC group is shown by over 48% of them selecting "strongly agree" or "strongly disagree" in 6 of 35 attitude questions. For this paper we will examine these 6 questions.

Item 37 states "Adopting a child is a good policy for a family who want more than two children." 77% of the High EC group and 52% of the Low EC group "agree or strongly agree." 48% of the High EC group and 24% of the Low EC group "strongly agree."

Item 41 states, "Our current cities should be abandoned since they are beyond help." 88% of the High EC group and 63% of the Low EC group "disagree or strongly disagree." 52% of the High EC group and 29% of the Low EC group "strongly disagree."

Item 48 states, "There are enough anti-pollution laws to control pollution problems." 86% of the High EC group and 45% of the Low EC group "disagree or strongly disagree." 49% of the High EC group and 24% of the Low EC group "strongly disagree."

Item 60 states, "There is little I should do to solve our problems until I become an adult." 86% of the High EC group and 45% of the Low EC group "disagree or strongly disagree." 48% of the High EC group and 17% of the Low EC group "strongly disagree."

Item 61 states, "Environmental quality should be neglected when economic considerations are involved. 75% of the High EC group and 42% of the Low EC group "disagree or strongly disagree." 42% of the High EC group and 15% of the Low EC group "strongly disagree."

Item 62 states, "Man is the only form of life that has rights." 88% of the High EC group and 52% of the Low EC group "disagree or strongly

disagree." 63% of the High EC group and 34% of the Low EC group "strongly disagree."

As with some of the multiple response choices by the Low EC group, a few of their continuum response choices are clearly not random. 40% or more of the Low EC group selected the same response in questions 36, 50, 59, 65 and 67. For questions 36 and 67 they "agree" that "Our Knowledge of Technology is more advanced than our knowledge of human behavior," and that "I should make other people aware of environmental problems." They prefer to express "no concern" for: question 50, "I can affect the decisions made in my city"; Question 59, "Our environmental problems will not be solved by existing American political and economic institutions"; and Question 65, "Technology's positive contribution to our lives far outweigh the negative."

SUMMARY AND CONCLUSION

This preliminary study approached a wide area of environmental information from cognitive, affective and connotative angles. The results clearly indicate areas of strength, weakness, and misconceptions in the information high school students gain from their school and the media. There also appears to be a relation between the information a student has and his willingness to express an opinion. It is tempting to say that the High EC group responded to the continuum response section in a manner more in line with conservation and environment groups than the Low EC group. This raises some question for evaluating environmental education programs. If there is a relation

between information and attitude, and information is easier to measure, is all our effort on attitudes important?

The strengths and weaknesses evident in the results might be ignored as expected results. It might appear that environmental education programs need only emphasize the areas of weakness and they will become strengths. It may not be that simple. How do the students assimilate and accommodate new information? Is this evident in their misconceptions and errors in response in the present study? Does the High EC group exhibit Low EC group approaches to any questions?

Recent work indicates that many individuals who should chronologically be at Piaget's formal operations level are still at the concrete level. (McKinnon and Renner, 1971). Many responses of the Low EC group, their blaming of industry for many pollution problems, may indicate a concrete operational level of thinking. Ignoring variables, and unable to consider many, a concrete operational thinker often selects the first and most obvious cause as the effect. It also appears that many High EC students may be at the concrete operational level but are better able to remember information and therefore score well. (Smith, 1969).

Future research needs to consider not only the source and intensity of environmental information, but the processing ability of students. Only in this manner can environmental education programs be designed which can help students understand the information about, and

comprehend the range and complexity of, the environment.

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APPENDIX

Items used in Questionnaire with Percentage responses for the total population, 454 students, the top 84 students, and bottom 116 students. The top and bottom groups were obtained from scores of 9 and above, and 4 and lower respectively on a 17 item content sub-test. The sub-test included questions, 1, 3, 4, 5, 11, 12, 14, 16, 17, 20, 22 23, 27, 29, 31, 32, 35.

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
1. Plowing under of grassy meadows may cause:			
A. destruction of all organisms in the soil	19	4	32
B. a general ecological inbalance in the area	21	17	19
C. a loss of water retention capacity of the soil	31	61	9
D. the ground to hold heat from the sun	5	0	9
E. none of the above	24	19	31
2. The primary reason for the rise of phosphate pollution in our nation's streams is:			
A. detergents	50	67	34
B. NTA	3	0	5
C. industrial wastes	32	26	34
D. farming techniques	2	0	3
E. sewage dumping	13	7	23

Percentage responses to questions for the total population (454 students), the High Environmental Content group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

3. Most of the DDT in our bodies comes from:

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. the air we breathe	28	14	37
B. the water we drink	10	8	14
C. the food we eat	47	74	27
D. none of the above	10	2	16

4. Nuclear power plants are built near bodies of water because the water is:

A. a coolant	22	45	10
B. an added safety factor in case of fire	9	5	17
C. an alternative power source	43	29	41
D. a disposal place for radioactive waste	23	20	27
E. a buffer between people and the plant	3	1	4

Percentage responses to questions for the total population (454 students), the High Environmental Content group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

5. Noise or sound is rated by the amount of decibels. The average noise level in decibels of a quiet living room is:

A. 5 decibels

B. 25 decibels

C. 50 decibels

D. 100 decibels

E. none of the above

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
25*	19	30
34	56	10
19	10	25
7	5	8
15	11	27

6. Which type of cleanser will produce the least amount of water pollution?

A. non-sudsing detergents

B. soap flakes

C. detergents with phosphates

D. enzyme detergents

E. detergents with GBK

43	44	38
11	19	11
13	5	18
19	18	16
13	14	16

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
7. The rate of the nation's population growth is primarily the result of:			
A. economic changes	18	25	21
B. social changes	11	5	16
C. ecological changes	28	30	28
D. political changes	6	0	9
E. moral changes	37	40	27
8. What is the main cause of most of the nation's air pollution?			
A. A natural occurance of an over-populated world	10	7	11
B. Lack of the politician's concern	6	1	11
C. Individual's lack of concern	26	31	24
D. Industrial overgrowth	44	37	41
E. Lack of applying technology	15	24	13

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
9. Laws which control pollution are passed only			
A. when serious need for protection of environment is seen	43	56	26
B. when the politicians are affected	20	25	22
C. when business sees it as a must	10	4	16
D. when needed	14	10	20
E. when technology cannot cope with the problem	14	6	16
10. Which of the following would be most detrimental to the physical environment?			
A. heavy industry	46	57	34
B. new housing	18	11	23
C. an Interstate highway	15	12	22
D. a cattle feeding lot	6	1	8
E. a mining operation	15	19	12

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (116 students).

11. A beautiful sunset with brilliant red flame sky is the result of

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
12	12	13
27	12	34
46	70	28
5	1	9
10	5	17

A. pollution in the air

B. a natural wonder to be admired

C. refraction of sunlight through particles in the air

D. only occurs in the summer

E. none of the above

12. DDT has recently been found in human mothers milk. It is due to

8	4	11
21	7	25
41	81	19
13	0	22
17	3	22

A. There is no problem because a small amount is not harmfull

B. improper washing of vegetables

C. cumulative effect of the pesticide in the food chain

D. being exposed to spraying or fogging of DDT during pregnancy

E. none of the above

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students,) and the Low Environmental Content Group (bottom 116 students).

13. Future new private homes should be built with the following percent of land for grass and trees

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. 15%	10	10	17
B. 30%	23	17	29
C. 45%	26	27	22
D. 60%	21	24	20
E. 75%	21	21	21

14. What is the biggest contributor to air pollution?

A. city incinerators	3	0	6
B. trash burning	5	0	11
C. automobiles	42	79	20
D. manufacturing industry	44	17	53
E. petroleum industry	7	5	9

Percentage responses to questions for the total population (454 students), the High Environmental Content group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
15. Dams are built			
A. to control floods	30	18	41
B. to provide for water needs of our populations	20	12	19
C. at great effort and cost which helps when added to the area's economy	5	1	13
D. more often than needed	6	5	1
E. to allow man to conserve and utilize fully his resources	39	64	23
16. Electric power plants which use fossil fuel are among the nation's largest pollutors. Why?			
A. Because the fuels are partially burned and the residue carried out the smoke stack	51	74	22
B. This is not the case, soon everything will be clean and electric	11	4	19
C. Nuclear power plants will soon solve the problem	11	1	22
D. People are not willing to reduce their use of electrical power	14	10	21
E. Anti-pollution devices for these plants are too expensive	13	12	16

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students, and the Low Environmental Content Group - (bottom 116 students.)

17. Which type of container produces the least amount of waste?

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
58	82	34
15	5	20
6	0	16
9	6	14
12	7	17

A. returnable bottles

B. aluminum case

C. no-deposit bottle

D. plastic containers

E. paper containers

18. Pesticides, hericides and fertilizers are needed to encourage maximum productivity of grain crops

15	13	16
36	38	28
21	19	28
18	19	22
10	11	4

A. This hows man's ability to control his environment

B. This gives a farmer more crops per acre and increases his profits

C. They grow better this way

D. The crops aren't strong enough to grow under natural conditions without these chemicals

E. This assures enough food for the world's populations

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students,) and the Low Environmental Content Group (bottom 116 students).

19. Approximately what percentage of the nation's population is still living in poverty?

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. 7%	7	2	9
B. 10%	18	20	15
C. 20%	22	21	19
D. 30%	26	30	24
E. 40%	27	26	33

20. The principal contributor to water pollution today is

A. municipal wastes	9	8	11
B. agricultural wastes	6	2	11
C. industrial wastes	65	83	43
D. recreational wastes	4	1	8
E. individual wastes	15	5	27

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

21. One of the problems with air pollution is that the pollutor does not always feel it because

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
11	20	8
18	11	26
10	1	23
44	54	27
17	14	17

A. the air currents make it someone's problem downwind

B. the air dilutes it so it is unnoticeable

C. It is not as bad as most people seeking publicity make it sound

D. the pollutor has become conditioned to it

E. none of the above

22. A country with an annual population percent increase of 4% will double its population in

12	5	18
9	4	14
12	10	16
48	61	38
19	21	14

A. 100 years

B. 77 years

C. 53 years

D. 25 years

E. 17 years

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

23. The heat retention of the earth's atmosphere is increasing because of:

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. increase in population	19	14	21
B. particles in the atmosphere	38	44	34
C. gases such as carbon dioxide	22	35	12
D. exhaust from high-flying aircraft	12	4	19
E. increased use of machinery	9	4	15

24. The clearing of land to create more farms can

A. feed more of the world's poor	27	14	30
B. allow the farmer to increase his income	17	5	23
C. cause no damage to the land whatsoever	9	2	16
D. cause an inbalance in the area's ecology	40	71	22
E. create no problem man cannot solve	6	7	9

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

25. Factories should be

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. all placed together	7	8	9
B. built downwind of residential areas	7	1	11
C. placed in the center of town	6	1	8
D. built at the edge of town	11	13	12
E. diversified locations depending upon the type of industry	69	76	59

26. The amount of solid waste created by individuals as compared to manufacturing is

A. 15% individuals vs. 85% manufacturing	23	19	22
B. 30% individuals vs. 70% manufacturing	35	38	27
C. 45% individuals vs. 55% manufacturing	24	27	24
D. 60% individuals vs. 40% manufacturing	9	10	9
E. 75% individuals vs. 25% manufacturing	9	5	17

Percentage responses to questions for the total population (454 students), the High Environmental Content group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

27. Which laundry product causes the least amount of water pollution?

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. detergents with phosphates	9	4	14
B. enzyme detergents	17	11	22
C. non-sudsing detergents	33	14	42
D. biodegradable detergents	31	68	8
E. NTA detergents	10	4	14

28. The SST or Super Sonic Transport plane

A. will improve the unemployment conditions by creating more jobs	9	7	12
B. will require a longer runway being a heavier and faster plane	19	14	28
C. poses no problem to the ecology of an area	11	10	14
D. will add to the noise level in most urban areas	48	55	34
E. has problems which can be controlled by technology	12	14	10

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

29. At its present growth rate the population of the U.S. will double in approximately

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
20	12	24
17	18	20
30	43	18
22	24	25
10	4	13

A. 10 years

B. 15 years

C. 25 years

D. 50 years

E. 70 years

30. The water supply provided by dams is limited by

35	29	28
8	0	12
27	32	21
6	5	9
24	35	30

A. amount of yearly rainfall

B. pollution from water sports

C. capacity of the purification plant

D. time it takes to fill up with sand and salt

E. none of the above

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (top 116 students).

31. Pesticides tend to kill:

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
A. only insects harmful to plants	25	11	29
B. some insects not harmful to plants	15	7	22
C. only insects and animals harmful to plants	13	4	23
D. some insects and animals not harmful to plants	43	77	18
E. only animals harmful to plants	4	1	7

32. During which season is air pollution most likely to be the strongest in the U.S.?

A. Summer	58	54	60
B. Fall	12	11	16
C. Winter	19	35	14
D. Spring	8	1	7

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

	TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
33. Oil causing ocean pollution is due to:			
A. off shore drilling	31	43	23
B. large oil tankers having wrecks	18	12	24
C. leakage of engines from ocean going vessels	16	5	25
D. pumping of tankers in port	7	4	10
E. spillage at sea	28	37	16
34. The Indiana harbor at the southern end of Lake Michigan has been in the news because:			
A. it will bring more money into the state	9	7	10
B. as a modern plant, it will produce less pollution	30	31	34
C. it will change the lakes environment	38	44	27
D. of alarmists causing trouble to publize a cause	12	12	10
E. it will create more needed jobs	11	5	18

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students).

35. How much of the nation's electrical power do we use in homes?

A. 10%

B. 25%

C. 50%

D. 75%

E. 90%

TOTAL 454 STUDENTS	TOP 84 STUDENTS	BOTTOM 116 STUDENTS
12	4	16
22	35	6
28	31	28
25	21	29
13	10	19

Percentage responses to questions for the total population (454 students), the High Environmental Content Group (top 84 students), and the Low Environmental Content Group (bottom 116 students.)

ECOLOGY ATTITUDE

40. Extinction of wildlife is a necessary result of man's involvement with nature.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	24	24	14	12	26
High EC	20	12	7	10	51
Low EC	28	31	16	9	16

42. Plants and animals should be primarily for man's use and enjoyment.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	14	24	16	26	19
High EC	4	23	13	35	26
Low EC	17	21	19	20	22

46. We should eliminate the use of pesticides to ensure the health and safety of man, domestic animals and wildlife, even though this will result in poorer crops.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	9	21	32	30	7
High EC	5	29	26	37	2
Low EC	12	17	39	22	8

52. The oceans represent an almost limitless source of food and resources for the future.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	21	35	20	17	6
High EC	27	38	12	19	4
Low EC	19	30	28	15	7

58. We should explore space further to help solve our environmental problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	10	22	23	24	20
High EC	10	20	20	29	21
Low EC	11	22	21	23	22

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

62. Man is the only form of life that has rights.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	9	10	13	23	44
High EC	4	5	4	25	63
Low EC	14	14	19	18	34

68. In order to keep raw materials from being used up too fast, an international authority must be established to ration them.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	14	28	35	17	4
High EC	13	35	32	14	5
Low EC	16	28	28	22	3

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

49. Individuals should not have to pay taxes for goods and services which do not affect them.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	20	28	26	21	5
High EC	10	31	25	29	6
Low EC	25	27	26	16	5

54. Foreign aid should be withheld from those countries who make little effort to control population.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	12	24	34	22	7
High EC	13	27	26	27	6
Low EC	13	21	37	19	9

59. Our environmental problems probably will not be solved by existing American political and economic institutions.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	30	37	13	5
High EC	17	38	18	20	7
Low EC	9	31	42	9	7

61. Environmental quality should be neglected when economic considerations are involved.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	6	11	26	33	23
High EC	2	4	15	37	42
Low EC	9	16	32	27	15

68. In order to keep raw materials from being used up too fast, an international authority must be established to ration them.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	14	28	35	17	4
High EC	13	35	32	14	5
Low EC	16	28	28	22	3

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and The Low Environmental Content Group (Low EC).

FAMILY ROLE ATTITUDE

37. Adopting a child is a good policy for families who want more than two children.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	31	28	17	14	9
High EC	48	29	11	8	5
Low EC	24	28	18	15	14

43. Only the family should make decisions regarding its size.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	24	27	24	16	9
High EC	18	20	27	21	13
Low EC	30	24	22	15	7

57. All American families must limit the number of children to two.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	18	19	23	26
High EC	13	24	15	26	19
Low EC	9	20	16	21	34

70. The tax system should be redesigned to encourage small families rather than large ones.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	22	22	36	11	8
High EC	31	26	25	12	6
Low EC	17	22	37	7	15

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

PERSONAL ROLE AND RESPONSIBILITY ATTITUDE

39. I am personally responsible for our present state of pollution.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	8	25	27	23	16
High EC	11	36	23	20	10
Low EC	9	22	28	19	21

44. In order to have a free country, the rights of the individual must come before social responsibilities.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	17	26	30	17	9
High EC	14	17	33	26	10
Low Ec	22	33	23	9	11

49. Individuals should not have to pay taxes for goods and services which do not affect them.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	20	28	26	21	5
High EC	10	31	25	29	6
Low EC	25	27	26	16	5

50. I can affect the decisions made in my city.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	11	31	31	17	8
High EC	13	39	21	18	8
Low EC	11	27	40	15	7

60. There is little I should do to solve our problems until I become an adult.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	8	12	16	35	28
High EC	7	4	4	37	48
Low EC	11	21	22	28	17

Percent responses to questions for the total population (total), the High Environmental Content Group (High Ec), and the Low Environmental Content Group (Low EC).

63. Computers represent a serious threat to the privacy of the individual.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	27	33	19	7
High EC	8	23	33	25	11
Low EC	15	27	33	15	9

67. I should make other people aware of environmental problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	23	47	19	7	3
High EC	24	62	12	1	1
Low EC	21	40	22	12	5

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and The Low Environmental Content Group (Low EC).

POLLUTION POLICY ATTITUDE

48. There are enough anti-pollution laws to control pollution problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	9	11	16	30	32
High EC	1	4	8	37	49
Low EC	12	15	23	25	24

53. Pollution of the environment is due to unconcerned citizens.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	26	37	15	14	7
High EC	29	42	11	17	2
Low EC	22	33	16	18	10

56. Most of the concern about environmental problems has been over exaggerated.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	5	15	24	35	20
High EC	1	6	17	44	32
Low EC	10	14	37	24	12

61. Environmental quality should be neglected when economic consideration are involved.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	6	11	26	33	23
High EC	2	4	15	37	42
Low EC	9	16	32	27	15

66. American beliefs and values have been a basic cause of our present pollution problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	9	32	25	21	7
High EC	8	57	15	17	2
Low EC	5	37	26	22	9

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and The Low Environmental Content Group (Low EC).

SOCIAL-POLITICAL ATTITUDE

41. Our current cities should be abandoned since they are beyond help.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	8	6	15	35	35
High EC	4	1	7	36	52
Low EC	13	7	15	34	29

51. Pollution and racism should be considered part of the same basic problem in society.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	22	24	24	17
High EC	8	12	19	33	26
Low EC	21	24	28	13	14

55. Society should discourage prolonging the lives of individuals who are in a state of permanent and complete mental and/or physical incapacity.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	14	34	18	20
High EC	10	15	32	17	26
Low EC	15	16	37	18	13

59. Our environmental problems probably will not be solved by existing American political and economic institutions.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	13	30	37	13	5
High EC	17	38	18	20	7
Low EC	9	31	42	9	7

66. American beliefs and values have been a basic cause of our present pollution problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	9	37	25	20	7
High EC	8	57	15	17	2
Low EC	5	37	26	22	9

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

69. Minority groups should not share blame for environmental problems.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	7	19	21	27	24
High EC	1	4	15	38	42
Low EC	13	29	24	20	12

70. The tax system should be redesigned to encourage small families rather than large ones.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	22	22	36	11	8
High EC	31	26	25	12	6
Low EC	17	22	37	7	15

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and The Low Environmental Content Group (Low EC).

TECHNOCRACY ATTITUDE

36. Our knowledge of technology is more advanced than our knowledge of human behavior.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	15	42	15	23	5
High EC	18	49	11	21	1
Low EC	18	41	18	17	5

38. Pollution problems should be solved through the use of existing technology.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	18	33	30	13	5
High EC	17	33	25	19	6
Low EC	20	27	34	11	6

47. When progress and conservation conflict, it is better to follow progress.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	8	15	26	28	22
High EC	2	4	19	37	37
Low EC	11	25	33	22	9

64. Man's environmental problems could be solved more easily by a greater understanding of human behavior than by advance in technology.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	16	37	29	14	4
High EC	11	37	31	19	1
Low EC	25	35	24	10	5

65. Technology's positive contribution to our lives far outweigh the negative.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	10	33	38	13	5
High EC	11	37	36	13	4
Low EC	10	25	42	17	3

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

63. Computers represent a serious threat to the privacy of the individual.

	Strongly Agree	Agree	No Concern	Disagree	Strong Disagree
Total	13	27	33	19	7
High EC	8	23	33	25	11
Low EC	16	27	33	15	9

Percent responses to questions for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).

UNASSIGNED QUESTION

45. If we understand how each part of something functions, then we will understand how the whole thing functions.

	Strongly Agree	Agree	No Concern	Disagree	Strongly Disagree
Total	18	39	17	20	6
High EC	14	44	8	25	7
Low EC	21	32	26	13	8

Percent responses to questions, for the total population (total), the High Environmental Content Group (High EC), and the Low Environmental Content Group (Low EC).